

SUPPLEMENTARY DESCRIPTION OF
CYPRIDINA AMERICANA (MÜLLER, 1890),
A LUMINESCENT MYODOCOPID OSTRACODE
FROM THE EAST PACIFIC

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Abstract.—The original description by Müller in 1890 of *Cypridina americana*, the only representative of the genus known from the vicinity of the Americas, and one of the two luminescent myodocopid ostracode species known from the East Pacific, consists of two short paragraphs and a single illustration of the carapace, and is inadequate for recognition of the species. The supplementary description is in considerable detail and all appendages are illustrated.

Cypridina americana (Müller, 1890) is the only species in the vicinity of the Americas of a genus having many representatives in the Indo-West Pacific Region, and is one of the two luminescent myodocopid ostracodes known to live in the East Pacific. The specimens described by Müller were from off the west coasts of Ecuador and Columbia and the specimen described here is from off the west coast of Mexico. (The other luminescent species from the East Pacific, *Varqula tsujii* Kornicker and Baker, 1977, was collected off Southern California.) Müller (1890) described his species from five specimens collected in 1845; the species was not collected again until 1981 when two specimens were netted by David Lapota who reported them to be luminescent (Lapota 1983:307) and sent one specimen to the National Museum of Natural History for identification by Anne C. Cohen and myself.

As previously stated by Poulsen (1962: 255) species descriptions by Müller in his 1890 paper are very incomplete; therefore, the opportunity to redescribe the species was welcome, despite having only a single specimen to study, which fortunately is an adult male, the sex more useful in discrimination of species in the Cypridinidae.

Cypridina americana (Müller, 1890)
Figs. 1-4

Pyrocypris americana Müller, 1890:211, pl. XXV: fig. 3; 1912:17, 18.

Cypridina americana.—Poulsen, 1962:555 (referral inferred), 557 (map).—Lapota, 1983:307.

Not *Pyrocypris americana*.—Brady, 1902: 185, pl. XXI: figs. 14-19.—Sharpe, 1908: 426, fig. 4. [See discussion in *Misidentifications of the species*.]

Holotype.—Not designated, syntypes apparently not extant, since attempts to locate them in a number of institutions have been unsuccessful.

Material.—1 adult male (USNM 159080).

Distribution.—Müller (1890:233; 1912: 18) gave the locality as off the west coast of Central America, but according to the latitudes and longitudes of the collections (5°N, 82°W, 3°N, 85°W, 3°S, 81°W) they are from off the west coasts of Ecuador and Colombia, as previously noted by Lapota (1983: 307). The specimen described herein is from west of Mexico (19°23.8'N, 105°18.9'W) (Lapota 1983:307).

Description of adult male (Figs. 1-4).—Carapace with linear or slightly concave



Fig. 1. *Cypridina americana*, adult male, USNM 159080, length 1.87 mm, complete specimen from right side with details of diagnostic dentition and bristles along anteroventral margin.

dorsal margin and broadly convex ventral margin (Fig. 1); tip of rostrum with anterior projection creating slight concavity in anterior margin of rostrum (Figs. 1, 2a, b, e); anterodorsal corner of rostrum only slightly rounded (Figs. 1, 2a, b, e); caudal process fairly short, and broadly rounded (Figs. 1, 2c, f); surface of valve with lineations in anterior half paralleling valve edge (Fig. 2g). Anteroventral edge of valve with about 25 lateral teeth (Fig. 1); outer edge of teeth linear, inner edge convex and joining outer edge at posterior end of tooth forming rounded to pointed tip (Fig. 1); teeth shorter and more closely spaced posteriorly along valve edge (Fig. 1).

Surface bristles (Fig. 1): Anteroventral edge of left valve with 9 bristles, of right valve with 7 bristles; anterior bristles separated from following bristle by 4–6 teeth,

remaining bristles separated by 3 or 4 teeth. Posterior margin of valve and lateral surface with very few slender bristles.

Infold (Fig. 2b, c, e, f): Rostral infold with 2–4 bristles forming row paralleling anterior edge of rostrum (Fig. 2b, e); bristles mostly double and largest bristle near tip of rostrum; 2 bristles (long and short) near inner end of incisur and 1 small bristle present dorsal to their bases (Fig. 2b, e). Anteroventral infold anterior to marginal teeth with 3 small bristles (Fig. 2b, e); anteroventral margin between marginal teeth with 4 short bristles; ventral infold with 3 widely spaced bristles along faint list distal to midwidth of infold; about 8 minute bristles or processes along list anterior to caudal process. Caudal process: posterior margin of anterior ridge with 20–25 irregular serrations (some poorly defined) (Fig. 2c, f); 2–3 serrations

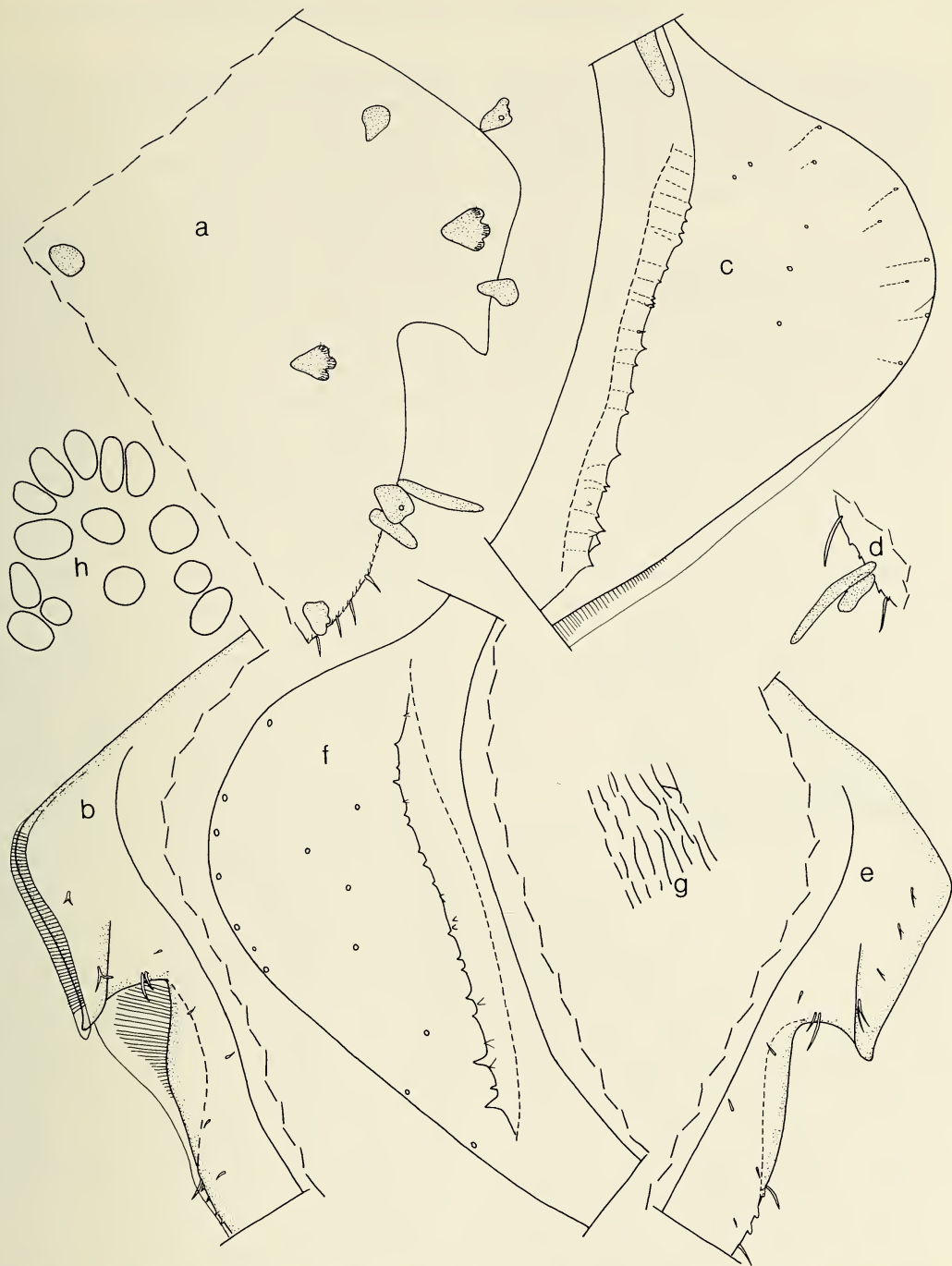


Fig. 2. *Cypridina americana*, adult male, USNM 159080, right valve: a, Lateral view of anterior showing attached epizoa (stippled); b, Inside view of anterior showing bristles of infold and selvage; c, Inside view of caudal process showing anterior ridge and pores of infold (posterior end of hingement stippled). Left valve: d, Outside view of part of anteroventral edge showing some dentition, 2 bristles, and 2 attached epizoa (stippled); e, Inside view of anterior showing bristles of infold, and anterior end of dentition and bristles along anteroventral margin; f, Inside view of caudal process showing anterior ridge and pores of infold; g, Surface lineations on anterior part of valve, viewed from inside, anterior to right; h, Central adductor muscle attachments viewed from inside, anterior to right.

at ventral end of ridge stouter than others; posterior edge of caudal process with several minute pores (each may contain small process) (Fig. 2c, f); additional similar pores between anterior ridge and posterior end of process.

Selvage (Fig. 2b, c): Anterior margin of rostrum with narrow selvage with inner edge set well back from valve edge and with narrow striations (Fig. 2b); selvage extending past tip of rostrum and apparently terminating there. Selvage along ventral edge of incisur very broad, also striate except near distal edge (Fig. 2b); selvage along anteroventral and ventral margin narrow, and striate only in proximal half; selvage becoming broader along posteroventral margin, then narrowing along ventral margin of caudal process, and apparently terminating near tip of process (Fig. 2c).

Central adductor muscle attachment (Fig. 2h): Consisting of about 14 ovoid and elliptical attachment areas.

Size: USNM 159080, length 1.87 mm, height 1.09 mm.

First antenna (Fig. 3a): 1st joint bare. 2nd joint with long hairs forming 2 distal rows on dorsal margin, abundant short spines forming rows on medial surface (not all shown on illustrated limb), and few long distal hairs on lateral surface near dorsal margin (not shown on illustrated limb). 3rd joint with short dorsal and longer ventral bristle, both with short marginal spines. 4th joint with 2 bristles (1 ventral, 1 dorsal (dorsal bristle only of illustrated limb with minute polyp with short stem and ovoid tip, probably foreign). Sensory bristle of 5th joint with 8 long proximal filaments and 2 shorter, distal, slender filaments; tip of bristle either blunt or with minute spine. 6th joint with short medial bristle. 7th joint: a-bristle about same length as bristle of 6th joint; b-bristle about same length as sensory bristle of 5th joint, with short proximal branch with stout base, round transparent sucker near middle, and small rounded process near pointed tip; distal part of b-bristle with 2

slender filaments, each bearing 5 or 6 minute suckers on small stalks (suckers missing from some stalks); tip of bristle with minute spine; c-bristle very long, about 6 times length of b-bristle, with short proximal branch with stout base; round transparent sucker (about $\frac{1}{3}$ greater diameter than sucker of b-bristle) near middle, and small rounded process near pointed tip; distal part of bristle with short proximal bare filament, followed by a longer more slender filament bearing 5 small suckers, and 5 long bare filaments; tip of bristle with minute spine. 8th joint: d-bristle slightly longer than b-bristle, bare with blunt tip; e-bristle similar but shorter; f-bristle very long, about same length as c-bristle, with 9 or 10 marginal filaments; g-bristle about half length of c-bristle, with 10 filaments (2 proximal filaments longer than 3rd filament).

Second antenna (Fig. 3b): Protopodite with small medial bristle with small marginal spines. Endopodite 1-jointed, with 6 bristles (4 short proximal, 1 longer distal, 1 longest terminal). Exopodite: 1st joint with minute distal spines forming few rows along ventral margin and on medial surface near ventral margin; bristle of 2nd joint reaching just past 5th joint, with about 11 ventral spines (spines stouter distally) and 1 faint proximal dorsal spine; natatory bristles of joints 3-8 without spines; 9th joint with 3 bristles (2 long with natatory hairs, 1 short (dorsal) bare); joints 3-8 with small basal spines increasing in size distally; spine of 8th joint about half length of 9th joint; 9th joint with lateral spine similar in size to basal spine of 8th joint; joints 6-8 with faint minute spines forming row along distal margin.

Mandible (Fig. 4a): Coxale endite well developed, spinous, with 2 stout terminal spines, 1 on each side of small triangular process; small bristle at base of endite. Basale: ventral margin with 2 small spinous ringed a-bristles, 1 small bare b-bristle, 2 c-bristles (proximal small, distal long, spinous; long bristle broken on illustrated limb),

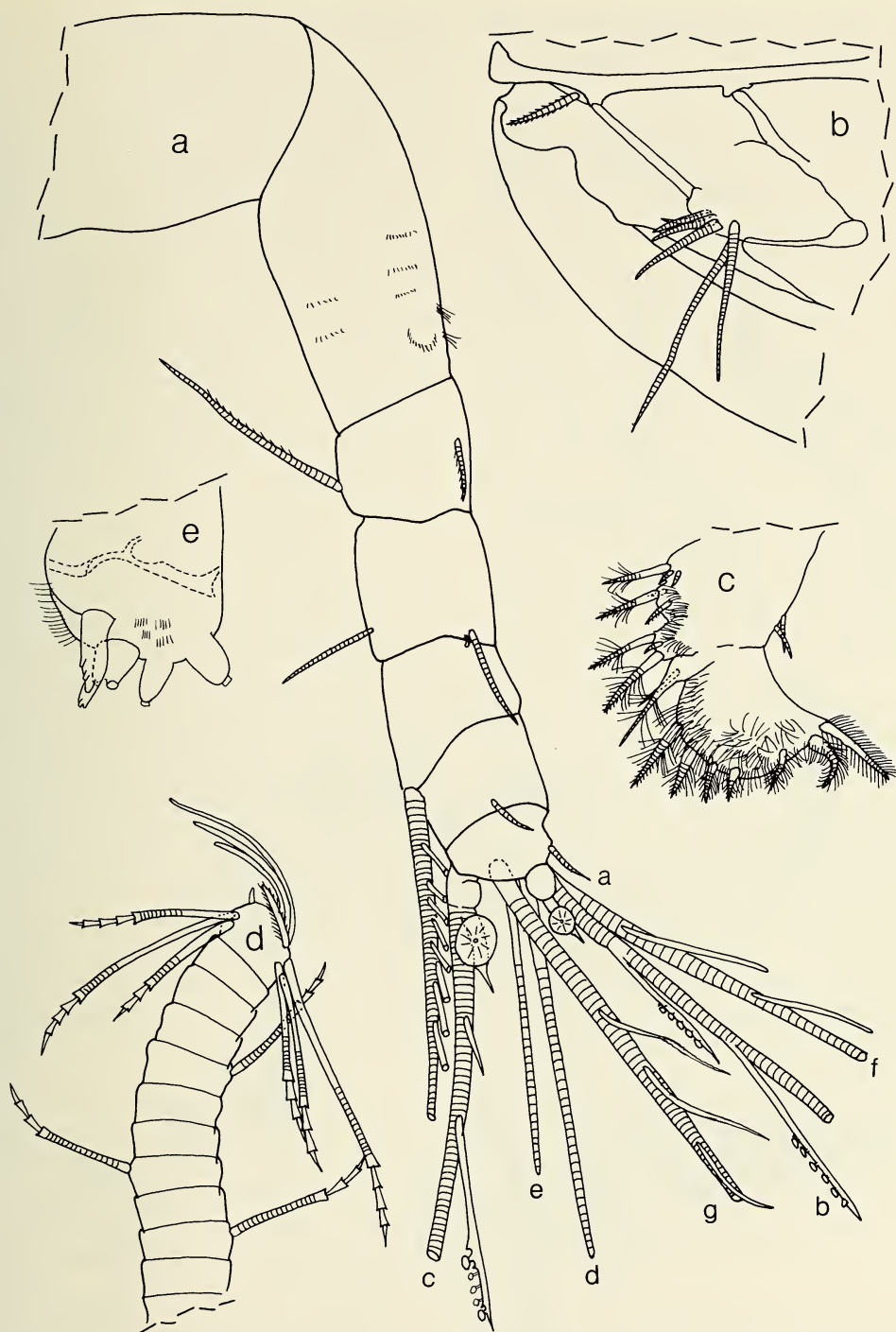


Fig. 3. *Cypridina americana*, adult male, USNM 159080: a, Left 1st antenna, medial view; b, Endopodite, distal part of protopodite, and proximal part of 1st joint of exopodite of right 2nd antenna, medial view; c, Right 6th limb, medial view; d, 7th limb; e, Upper lip, anterior to right (2 posterior tusks of left side not shown).



Fig. 4. *Cypridina americana*, adult male, USNM 159080: a, Right mandible, medial view; b, Maxilla (twisted); c, Left 5th limb, posterior view; d, Posterior of body from left showing left lamella of furca, left copulatory limb, left Y-sclerite, and ventral end of girdle; e, Right lateral eye; f, Medial eye and Bellonci organ.

and 2 d-bristles (proximal short, distal long, both with spines); ventral margin between a- and b-bristles spinous; dorsal margin with 3 bristles (1 distal to midlength, 2 terminal); medial surface of joint and proximal dorsal margin spinous. Exopodite reaching just past distal end of dorsal margin of 1st endopodial joint, with hirsute terminal pad and 2 distal bristles (distal of these stouter and shorter than proximal). 1st endopodial joint with 4 ventral bristles (1 minute, bare, others spinous and of unequal length. 2nd endopodial joint: ventral margin spinous with 2 single bristles and terminal paired bristles, all pointed; dorsal margin with 4 or 5 long bristles and 7 shorter bristles; medial surface spinous; end joint with 3 claws (2 pectinate proximally) and 4 bristles.

Maxilla (Fig. 4b): Endite I with 7 bristles; endites II and III, each with 5 bristles. Coxale with dorsal hairs near base of hirsute dorsal bristle. Basale with 2 short bare bristles. Exopodite broad, hirsute (hairs not shown on illustrated limb), with 3 bristles (proximal and middle bristle with long marginal hairs, other with short hairs. Endopodite: 1st joint (twisted on illustrated limb) with 1 alpha-bristle with long marginal hairs and 2-beta bristles (longer stout pectinate, shorter slender with short marginal spines or hairs); cutting tooth comprising bifurcate tooth with distal tooth much longer. 2nd joint with 3 slender bare a-bristles, 4 ringed b- and c-bristles, and 3 d-bristles (2 stout, unringed, pectinate, 1 stout, ringed, pectinate).

Fifth limb (Fig. 4c): Epipodite with 35 bristles. Anterior tooth-like process of propodite absent. Endite I with 5 bristles (anterior short, others longer, with long proximal spines and short distal teeth; endite II with 5 bristles (1 posterior short, unringed, triangular; 2 ringed with long proximal spines and short distal teeth; 1 ringed, with short marginal spines; 1 unringed with short marginal spines); endite III with 7 bristles (1 posterior short, unringed, triangular; 1 posterior stout, ringed, with long proximal spines and short distal teeth; 1 anterior long,

ringed, with long proximal and short distal spines; 2 ringed with short marginal teeth or spines; 2 unringed with short marginal teeth). 1st exopodial joint: main tooth comprising triangular peg and 6 pectinate teeth; bristle proximal to triangular peg with long proximal hairs and few short distal spines; anterior side with 2 ringed bristles with long proximal hairs and small distal spines. 2nd exopodial joint with total of 5 or 6 a- and b-bristles, 1 c-bristle with long proximal hairs and fairly long distal spines, and 1 d-bristle with long proximal and short distal spines. 3rd exopodial joint: inner lobe hirsute, with 3 bristles (proximal short with long proximal hairs and short distal spines; shorter terminal bristle unringed, with few short marginal teeth; longer terminal bristle ringed, with short marginal spines); outer lobe hirsute, with 2 short ringed bristles with short marginal spines; 4th and 5th exopodial joints fused, hirsute, with 3 ringed bristles with short marginal spines.

Sixth limb (Fig. 3c): With 2 small bare epipodial bristles. Endites I and II each with 2 short medial bristles and 1 long terminal bristle; endite III with 3 terminal bristles (small bristle with medial base between 2 long bristles with terminal bases); endite IV with 2 terminal bristles (small bristle with base on medial side, long bristle with terminal base). End joint with 4 bristles (with long proximal and short distal spines) along anterior half of ventral margin, followed by space and 1 bristle (with base on medial side and with long spines almost to tip), then a smaller space and 2 stout hirsute bristles; total of 7 bristles on end joint; medial surface of limb excluding endites I and II hirsute; ventral margin of end joint anterior to 2 posterior hirsute bristles with spines forming row (some spines with bases on lateral side of joint).

Seventh limb (Fig. 3d): Each limb with 9 bristles: 3 proximal (1 or 2 on each side, all with 3 bells); 6 terminal (3 on each side, with 3-5 bells). Terminal comb with 7 teeth (longest tooth in middle; lateral short tooth with long proximal and shorter distal spines).

Peg opposite comb elongate, with few small terminal spines.

Furca (Fig. 4d): Each lamella with 9 claws decreasing in length and width posteriorly; 3rd claw not weaker than 4th; claw 2 fused to lamella, remaining claws separated from lamella by well defined suture; all claws with small slender teeth along posterior concave margin; claws 1–4, possibly others, also with fine distal hairs along anterior convex margin; claw 1 with several fairly large, medial, distal teeth; claw 1 of right lamella anterior to claw 1 of left lamella by width of claw measured at its base.

Bellonci organ (Fig. 4f): Short, pear-shaped, with small terminal process.

Eyes: Medial eye bare, without pigment (Fig. 4f). Lateral eyes well-developed, with 15 or 16 reddish-brown ommatidia surrounded by amber matrix (Fig. 4e). (See *Remarks concerning pigmentation.*)

Upper lip (Fig. 3e): With 2 unpaired anterior processes, each with terminal glandular opening, and 2 pairs of posterior processes (anterior pair medial to posterior pair and shorter, each with 3 glandular openings near tip (1 medial, 2 terminal); posterior pair of processes each with 3 or 4 distal glandular openings); lateral surface of lip proximal to processes with spines forming rows; bulge posterior to processes hirsute.

Copulatory organ (Fig. 4d): Well developed, oval lobes with distal serrate process.

Posterior of body (Fig. 4d): Bare, smoothly rounded, without dorsal process.

Y-sclerite (Fig. 4d): Dorsal branch with offset distal part.

Pigmentation: Appendages and upper lip without pigmentation. (See *Remarks concerning pigmentation.*)

Bioluminescence: While alive, specimen produced intense blue luminous cloud (Lapota 1983:307).

Epizoa (Fig. 2a, d): USNM 159080, with elongate and digitate unidentified forms without visible stalk.

Remarks concerning pigmentation. — Müller (1890:233) stated that the append-

ages of *C. americana* have pigment as in *C. chierchia* (Müller, 1890:232), which has pigmentation in the 1st antenna, mandible, maxilla, and 5th limb (Müller 1890:232). In a key to members of the genus, Müller (1912: 16) used the presence of pigmentation in the 1st antenna to separate *C. americana* from several species. The absence of pigmentation in appendages of the specimen described herein could be interpreted to indicate that it is not *C. americana*, and I concur that if newly collected specimens are without pigment the species should be considered new. I find it expedient to assume that the specimen described herein once had pigmented appendages, and that the pigment has become bleached during storage. Support for that conclusion comes from consideration of the lateral eye, which in other species of the genus has a matrix of black pigment surrounding amber ommatidia, but in the specimen described herein has a light amber matrix surrounding reddish-brown ommatidia.

Comparisons. — *Cypridina americana* closely resembles *C. dentata* (Müller, 1906: 20). The carapace differs in two characters: 1, the serrations along the posterior edge of the anterior ridge on the infold of the caudal process are less well defined on *C. americana*; and 2, the small plates along the anteroventral margin are squarish with rounded corners on *C. dentata* and plano-convex (almost comma-shaped) on *C. americana*.

Misidentifications of the species. — Brady (1902:185) reported the species (as *Pyrocypris americana*) and described an adult male. He stated (1902:185) that the sample was collected by the *Galathea* Expedition, 10 Sep 1875, but gave no other locality information. Mrs. Anne C. Cohen, at my request, wrote to Dr. Torben Wolff of the Copenhagen Zoological Museum, Denmark, for information concerning the locality of the sample. Dr. Wolff (in litt, 15 Jan 1976) kindly informed us that he had two *Galathea* samples with specimens of *P. americana* identified by Brady, but that the pub-

lished dates were incorrect and should have been 9 Oct 1845. The given locality of the sample is Trincomale, East Ceylon. Brady's description of the species is not in sufficient detail to permit its exclusion from *Cypridina americana* with absolute certainty, but it is more likely to be one of the many species of *Cypridina* now recognized in the Indian Ocean, and for that reason I have not included Brady's specimens in the synonymy above. Brady (1902:185) actually attributed the identification of the specimens as *C. americana* to Dr. G. W. Müller, but Müller (1912:18) questioned the identification, and did not include the Ceylon (Sri Lanka) locality in the distribution of *C. americana*.

Sharpe (1908:426) reported *C. americana* (as *Pyrocypris americana*) based on a specimen collected off Honolulu, Hawaii, in 1902 at the surface and at night. The furca of Sharpe's specimen (Sharpe 1908:fig. 4) differs from that of *C. americana* in having the 4th claw stouter than the 3rd. Müller (1912:19) correctly removed the specimen from *C. americana*; he referred it to *Pyrocypris sharpei* Müller, 1912 (= *Cypridina sharpei*).

Baker (unpublished dissertation 1975:86) identified specimens collected on the continental shelf (silty sand to silt substrate) off Southern California. The specimens were restudied by Kornicker and Baker (1977:218) who referred them to a new species *Varqula tsujii*. Hobson and Chess (1976:584, 585) reported *Varqula americana* in shallow water off Santa Catalina, California, but in a later paper (Stepien and Brusca 1985:93) these specimens were reidentified as *V. tsujii*.

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Literature Cited

- Baker, J. H. 1975. Distributions, ecology, and life histories of selected Cypridinacea (Myodocopida, Ostracoda) from the southern California mainland shelf. Ph.D. Dissertation, University of Houston, Houston, Texas, xvii + 185 pp.
- Brady, G. S. 1902. On new or imperfectly-known Ostracoda, chiefly from a collection in the Zoological Museum, Copenhagen. — Transactions of the Zoological Society of London 16(4):179–210.
- Hobson, E. S., and J. R. Chess. 1976. Trophic interactions among fishes and zooplankters near shore at Santa Catalina Island, California. — Fishery Bulletin 74(3):567–598.
- Kornicker, L. S., and J. H. Baker. 1977. *Varqula tsujii*, a new species of luminescent Ostracoda from lower and southern California (Mydocopa: Cypridininae). — Proceedings of the Biological Society of Washington 90(2):218–231.
- Lapota, D. 1983. Bioluminescence in the marine ostracod *Cypridina americana* (Müller, 1890) off Manzanillo, Mexico (Mydocopa: Cypridininae). — Proceedings of the Biological Society of Washington 96(2):307–308.
- Müller, G. W. 1890. Neue Cypridiniden. — Zoologische Jahrbuecher 5(2):211–252.
- . 1906. Die Ostracoden der Siboga-Expedition. — Siboga Expedition monographie 30:1–40.
- . 1912. Ostracoda. — Das Tierreich 31:1–434.
- Poulsen, E. M. 1962. Ostracoda-Mydocopa, 1: Cypridiniformes-Cypridinidae. — Dana Report 57:1–414.
- Sharpe, R. W. 1908. A further report on the Ostracoda of the United States National Museum. — Proceedings of the United States National Museum 35(1651):399–430.
- Stepien, C. A., and R. C. Brusca. 1985. Nocturnal attacks on nearshore fishes in southern California by crustacean zooplankton. — Marine Biology, Progress Series 25:91–105.

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